Digital Salinity Sensor

CLOUD

Support the Internet of Things
Base on RS-485
MODBUS partially compatible
Step onto Industrial 4.0

Table

1 Product introduction

The salinity digital sensor is a new generation of intelligent water quality detection digital sensor which researching and developing by our company. It uses a high-performance CPU chip to measure the salinity and convert it into a salinity value. It uses a high-performance CPU chip to measure conductivity and convert it to a salinity value. Can view data, debug, maintenance, etc. through mobile APP or computer. It has the characteristics of simple maintenance, high stability, excellent repeatability and versatility, and can accurately measure the conductivity and salinity value in the solution. It is widely used in the continuous monitoring of conductivity and salinity values in solutions such as thermal power, chemical fertilizer, metallurgy, environmental protection, pharmaceutical, biochemical, food and tap water.

2 Main features

- ✧ This product is digital salinity sensor, which can directly output RS485 signal and 4~20mA signal.
- ✧ It has high precision, high stability and strong anti-interference ability.
- ✧ Using the mobile phone APP, to collect, debug and maintain the sensor through wired (OTG line and 485 to USB module) or wireless network (such as WIFI, GPRS and other wireless networks).
- ✧ It can be directly connected to computers, PLCs and other devices with RS485/4-20mA signal interface for data acquisition and

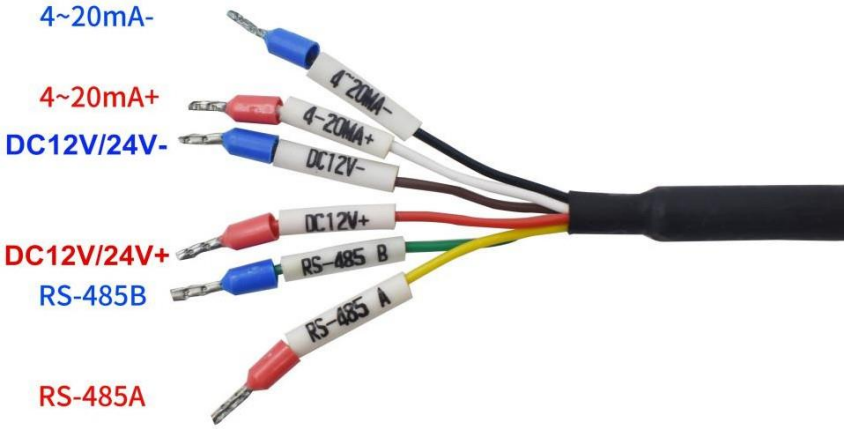
maintenance; it is convenient for users to integrate sensors into the industrial computer system such as PC system and IoT without instrument.

- ✧ The sensor can be set with RS485 communication for its slave address, baud rate, online calibration, factory reset, 4-20mA output corresponding range, coefficient of proportionality, incremental compensation and other settings.
- ✧ Three point calibration.
- ✧ Power off protects > 10 years.

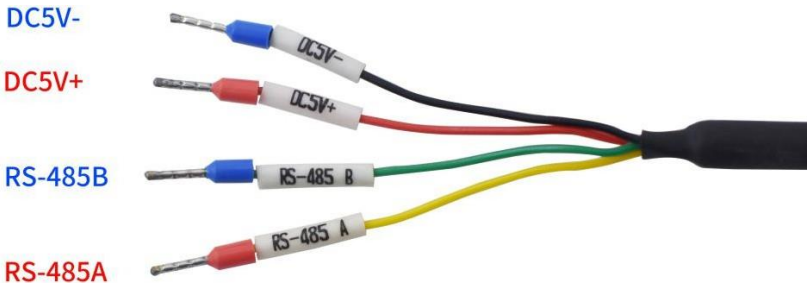
3 Technical indicators

- ✧ Measurement range: 0～20.000 mS·cm-1 0～0.150 mol/L
- ✧ Resolution: 0.001mS·cm-1 0.001 mol/L
- ✧ Precision: 2.0% (FS)
- ✧ Automatic temperature compensation: 0 ～ 60°C Warming: NTC10K
- ✧ 485 Interface: support IOT (MODBUS protocol)
- ✧ Working conditions: ambient temperature is 0-60 ° C
- ✧ Input impedance: ≥1×1012Ω
- ✧ Output load: 4-20mA load <500Ω (optional)
- ✧ Working voltage: DC 5V or DC 12V or 24V
- ✧ Protection rating: IP68

Wiring Instructions (DC12V / DC24V):



Wiring Instructions (DC5V without 4~20mA)



Conductivity Salinity Digital Sensor Communication Protocol

MODBUS-RTU	
Baud Rate	9600（Default）
Equipment NO	1（Default）
Data Bit	8 Digits
Odd-Even Calibration	NO
Stop Bit	1 Digits

Register Setting

Register Name	Address	Data type	Length	Read/ Write	Instruction
Conductivity Display Value	R0	Unsigned	1	R	（Keep three decimals）
Salinity Display Value	R1	Unsigned	1	R	（Keep three decimals）
4mA Output Display Value	R2	Unsigned	1	R	（Keep three decimals）
20mA Output Display Value	R3	Unsigned	1	R	（Keep three decimals）
Conductivity Range Lower Limit	R4	Unsigned	1	R	The default is 0
Conductivity Range Upper Limit	R5	Unsigned	1	R	The default is 20000 (Keep three decimals)
Scale Factor	R6	Unsigned	1	R	（Keep one decimals）
Increment	R7	Signed	1	R	（Keep three decimals）
Resolution	R8	Signed	1	R	The default is 3
Product Identification	R9	Signed	1	R	The default is 503
Register Address	R10	Unsigned	1	R	The range is 1-127
Baud Rate	R11	Unsigned	1	R	1200 2400 4800 9600 19200 38400 57600
Function Call	R12	Unsigned	1	W	Look at the parameter settings in detail
Factor 1	R13	Unsigned	1	W	Look at the parameter settings in detail
Factor 2	R14	Unsigned	1	W	Look at the parameter settings in detail.

4 MODBUS Instruction format

This sensor is compatible with 0x03, 0x06, 0x10 function codes of MODBUS protocol.

0×03 Instruction Format:

Definition	Address	Function Code	Initial Address	Number of Register	CRC Calibration
Data	ADDR	0×03	Rstart	Rnum	CRC 16
Number of Bytes	1	1	2	2	2

0×03 Return Format：

Definition	Address	Function Code	Number of Data	Data	CRC Calibration
Data	ADDR	0×03	Rnum*2	Data	CRC 16
Number of Bytes	1	1	1	Rnum*2	2

0×06 Command Format:

Definition	Address	Function Code	Number of Data	Data	CRC Calibration
Data	ADDR	0×06	Raddr	Data	CRC 16
Number of Bytes	1	1	2	2	2

0×06 Return Format (same as command):

Definition	Address	Function Code	Number of Data	Data	CRC Calibration
Data	ADDR	0×06	Raddr	Data	CRC 16
Number of Bytes	1	1	2	2	2

0×10 Command Format:

Definition	Address	Function Code	Initial Address	Number of Register	Number of Data	Data	CRC Calibration
Data	ADDR	0×10	0×000C	0×0003	0×06	Data	CRC 16
Number of Bytes	1	1	2	2	1	6	2

0×10 Return Format:

Definition	Address	Function Code	Initial Address	Number of Register	CRC Calibration
Data	ADDR	0×10	0×000C	0×0003	CRC 16
Number of Bytes	1	1	2	2	2

5 Data reading

The sensor data is read using MODBUS protocol 0x03 function code.

Example: Reading salinity value

Sending the command: 01 03 00 00 00 02 C4 0B

Return: 01 03 04 1A CC 09 C4 3A D7

The part of data is: 1A CC 09 C4

Salinity value: The data 0x09C4 is converted to a binary of 2500, a salinity value of 2.500 mol/L, and a 3-digit decimal number.

6 Parameter adjustment

1. The sensor parameters are adjusted using the 0x06 or 0x10 function code of the MODBUS protocol.
2. Use 0x06 function code to adjust parameters into 3 steps:
   (1)Write parameter 1 to the R13 register.
   (2)Write parameter 2 to the R14 register.
   (3)Write the function number to the R12 register.
3. Using the 0x10 function code, you need to enter the function

number, parameter 1, and parameter 2 to the three registers starting with R12. equal to separate entering.

4. When the function debugging is successful, the R12, R13, and R14 registers are reset to 0. If the function debugging fails or the parameters are incorrect, the R14 register will display -1.

Function Call Parameter List

Function	Parameter 1	Parameter 2	Function Number
Zero Calibration	Zero Conductivity*1000	1	1
Slope Calibration	Slope Conductivity*1000	2	1
Compensation Calibration	Compensation Conductivity*1000	3	1
Change the 4-20mA Output Range (Need to be customized)	4mA Output Representative Value	20mA Output Representative Value	3
Change Correction Factor	Scale Factor	Incremental Value for Indicating	5
Change Slave Configuration	New Slave Number	New Baud Rate	6
Restore Factory Setting	Password:20034	Arbitrary Value	7

Example: Salinity value calibration (Using 0×10 function code)

Zero calibration: The salinity of the standard solution is 0.730 mS/cm, 0.730*1000=730, and the conversion to hexadecimal is 0×02DA. Therefore, the function number is 0×0001, the parameter 1 is 0×02DA, and the parameter 2 is 0×0001.

The data section is: 00 01 02 DA 00 01

Send command: 01 10 00 0C 00 03 06 00 01 02 DA 00 01 FA FC

Return: 01 10 00 0C 00 03 40 0B

Slope calibration: The salinity of the standard solution is 14.130 mS/cm, 14.130*1000=14130, and the conversion to hexadecimal is 0×3732. Therefore, the function number is 0×0001, the parameter 1 is 0×3732, and the parameter 2 is 0×0002.

The data section is: 00 01 37 32 00 02

Send command: 01 10 00 0C 00 03 06 00 01 37 32 00 02 35 05

Return: 01 10 00 0C 00 03 40 0B

7 Precautions and maintenance

- 1. If the electrode is not used, please store it in a dark, dry and ventilated environment.
- 2, The measuring electrode is a precision component, can not be decomposed, can not change the shape and size of the electrode, and can not be cleaned with strong acid or alkali, so as not to change the electrode constant and affect the accuracy of the meter measurement. The measuring cable is a dedicated cable and cannot be replaced.
- 3. When measuring the electrode, it should be cleaned in distilled water (or deionized water) first, and the filter paper should be used to absorb moisture to prevent impurities from being introduced into the liquid to be tested. Check if the terminal is dry. If there is dirt, please use none. Wipe with water alcohol and use it after drying.
- 4. The electrode is used for a long time. When the measurement error occurs, it must be calibrated with the instrument.
- 5.When the calibration and measurement cannot be performed while maintaining and maintaining the electrode in the above manner, the electrode has failed. Please replace the electrode.